

# ON THE NATURAL DISTRIBUTION OF THE RARE TREE FROG *RHACOPHORUS TAENIATUS* BOULENGER, 1906 (ANURA:RHACOPHORIDAE), WITH NOTES ON ITS BIOLOGY AND OSTEOLOGY<sup>1</sup>

PRANJALENDU RAY<sup>2</sup>  
(With eight text-figures)

*Rhacophorus taeniatus* was originally described by Boulenger (1906) from Purnia (Bihar) based on two examples. Subsequent to the original report this rare tree frog was recently rediscovered from the Dudwa National Park in Uttar Pradesh. The present observation extends the range of natural distribution of this tree frog from north-eastern to north-western India, especially in the terai region of Uttar Pradesh. Its natural habitat, morphological features, sexual dimorphism, osteology, food and feeding habits, etc. are discussed. Suggestions for its inclusion in Schedule I of the Wildlife (Protection) Act of India, are also given. A lectotype is also designated.

## INTRODUCTION

New information about *Rhacophorus taeniatus* Boulenger is desirable since this tree frog has been rarely noted in literature. In his revision of genus *Rhacophorus* of the world, Wolf (1936) surmised that only the two syntypes from Purnia (Bihar) are known. During a recent survey of Dudwa National Park, Uttar Pradesh, I collected 14 specimens of *R. taeniatus*. This additional material brings to 16 the total number of specimens of *R. taeniatus* known. They allow me to augment the original description and offer good illustrations as well as extend the range to the terai region of Uttar Pradesh.

Wolf (1936) stated that it is 'only found once from the type locality'; Gorham (1974) documented its distribution as "Asia" and Inger and Dutta (1987) erroneously noted its distribution as "West Bengal". The present record of the species in the Dudwa National Park (28° 21' to 28° 42' N, 80° 31' to 80° 56' E) constitutes the first record outside the type-locality. Boulenger's (1906) account of the species, though sufficient at that time, is now inadequate to identify the species amongst large number of specimens of different age and sex. Of the two syntypes, one is in the repository of the Zoological Survey of India, Calcutta and the other in the British Museum (Natural History).

I have studied the syntype in the Zoological Survey of India, Calcutta, and coupled with extensive field observations of the habitat, call and reproductive behaviour in nature, redescribe *Rhacophorus taeniatus* on the basis of the new material. The syntype in the British Museum (Natural History) is designated as the lectotype; and the syntype present in the Zoological Survey of India becomes the paralectotype *vide* Article 74 (a) of the International Code of Zoological Nomenclature.

## SYSTEMATICS AND BIOLOGY

### *Rhacophorus taeniatus* Boulenger (Figs. 1-8)

*Rhacophorus taeniatus* Boulenger, 1906, *J. Proc. Asiat. Soc. Beng.*, (N. Sr.), 2: 385 (type-locality : Purneah, Bengal).

**Material examined:** i) Syntype (SVL 46 mm), Zoological Survey of India, Calcutta, Registration No. 15715, herewith designated as Paralectotype; *Coll.* W. Partridge.

ii) INDIA: Dudwa National Park, District Lakhimpur-Kheri (Uttar Pradesh); 3 females and 4 males, Sathiana forest near Sathiana Forest Rest House, 11 June 1987, *Coll.* P. Ray, Regd. No. ZSI/NRS-A 188; 4 females and 3 males, Near Belraien Forest Rest House, 21 July 1986, *Coll.* P. Ray, Regd. No. ZSI/NRS-A 189.

**Diagnosis:** (SVL 42-45 mm O; 35-38 mm O) Slender smooth-skinned arboreal rhacophorid. Tip of snout acuminate, nostrils nearer to the tip of snout than the anterior corner of eye. Vomerine

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<sup>2</sup>Zoological Survey of India, Northern Regional Station, Dehra Dun 248195.

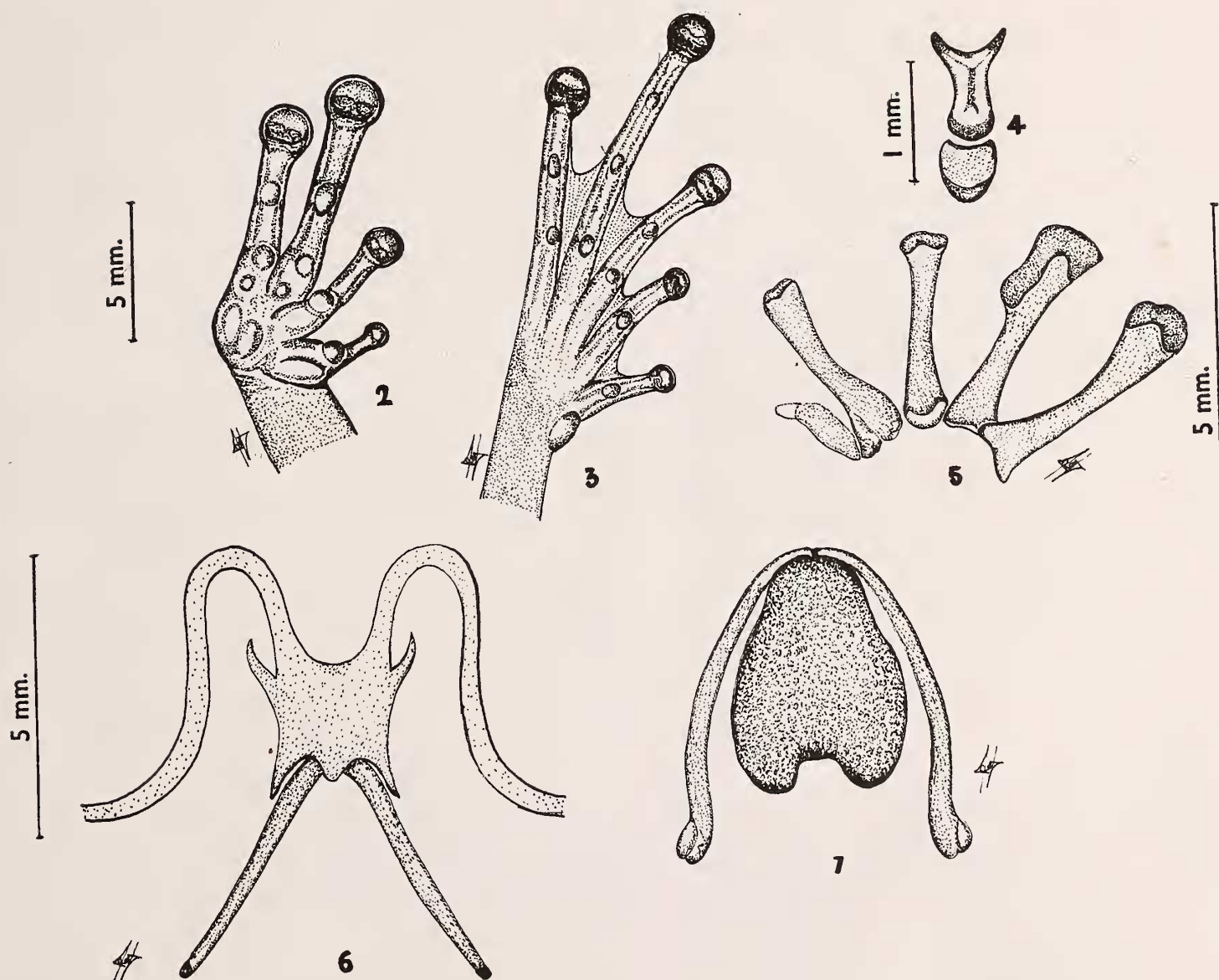


Fig. 1. *Rhacophorus taeniatus*

1. Dorsal aspect, 2. Hand, 3. Foot, 4. Last phalange of third finger, 5. Metacarpals, 6. Hyoid, 7. Tongue with lower jaw.



teeth in small groups in between choanae. Loreal region vertical. Tongue broad and fleshy, narrower in front and wider behind where it is prolonged at each angle to form two cornua; gap between two cornua almost equal width of a cornua. Head length 1.0-1.1 times its width and 3.3-3.6 times Snout to Vent Length (SVL). Diameter of eye 1.3-1.7 times length of snout; tympanum 1.3-1.5 times eye diameter and internarial distance 1.0-1.2 times interorbital width.

Fore limbs slender 1.0-1.7 times SVL; fingers with well developed digital disc bearing distinct circum-marginal groove on outer and inner margin; digital disc of third and fourth fingers larger than first and second. Length of first finger 1.25-1.5 times length of second finger; third finger longest, fourth almost equal to the length of snout. Subarticular tubercles of third and fourth fingers well developed and larger than the rest; additional tubercles present below proximal subarticular tubercle; twin outer palmer tubercle distinct. Hind limbs long and slender, 0.7-0.75 times SVL; diameter of tibia 4.2-5.0 times its length. Foot length almost equal to length of tibia in males, but in females shorter than tibia, tips of toes with distinct discs, but its diameter less than the diameter of discs of third and fourth finger. Tibio-tarsal articulation extends well beyond anterior margin of eye; webbing in between toes less than half, two digits in all toes except three digits of fourth toe devoid of web. Subarticular tubercles distinctly elongate, almost equal in dimension. Inner metatarsal tubercle elongate and 2.5-2.6 times length of first toe. An extensive anal dermal flap present just above the anus. Skin of abdomen and the ventral aspect of thigh act as an adhesive apparatus while sitting adpressed with the substratum.

**Colour:** In life, dorsal side brilliantly coloured with dark brown, a faint black median line on the anterior side of head, shiny golden yellow longitudinal band spread over tip of snout on each side, runs through the upper eyelid and laterodorsal aspect of body and continues up to coccygeal region; similar band runs along outer margin of femoral and tibial regions. The bands of body and

legs are so beautifully oriented that they look like a confluent band, while the animal is resting. On each side below this shiny laterodorsal band a dark brown longitudinal band runs from the loreal region below the tympanic area and continues up to the groin. Inner margins of dark brown dorsal and lateral band shows darker hue which contrasts with the golden-yellow band. Ventrally white impregnated with aeriolar glands of yellowish hue.

Since the longitudinal bands camouflage them in the tall grasses (*Typha elephantiana*), it becomes very difficult to locate them in their habitat unless they move. While sitting they blend so well with the stem that it is difficult to spot them because in the same habitat grasshoppers of similar coloration move about.

**Sexual dimorphism:** Adult breeding males are markedly smaller than the females. Males have a distinct inflatable vocal sac below the floor of mouth and when the frog calls the sac is dilated and acts as a resonator. The sac is externally covered with a layer of striated muscular fibre derived from mylo-hyoid muscle. Sexual dichromatism is exhibited, with brighter colouration in males than in females. The length of the foot is less than the tibia in males, versus equal in length in females.

**Osteology:** Some salient osteological features are: skull width almost equal to its length, triangular in shape; length of skull almost equal to the length of urostyle; maximum diameter of orbit equal to distance from tip of premaxilla to anterior margin of orbit; nasal broad anteriorly, rests upon the nasal-cartilage; inferior surface of premaxilla and maxilla with single row of teeth along the margin; outer border of vomer with three processes interspersed two notches, the hinder notch bounding the posterior nares, spoon-shaped inner portion bears irregular row of small blunt teeth on its ventral surface. Cartilaginous body of hyoid squarish, pointed elongated processes project from anterior and posterior corners of each side; anterior cornua projects from anterior margin of hyoid body, first forward then takes a backward curve and again an upward direction to unite with the cartilage of the prootic bone; bony rods project



as posterior cornua which run from the hind margin and diverge posteriorly to enclose the larynx. Omosternal style with a ventromedian ridge, bears spade-like cartilage on the distal end and forked at the proximal end; each fork rests on the clavicle. Xiphisternum an elongated rod of cartilage ensheathed in bone and bears a small round piece of cartilage on distal end. Epicoracoid a pair of narrow cartilage closely applied to each other and placed between the ventral end of the precoracoid and epicoracoid. Suprascapula with broad semicircular outer margin and narrow thickest border articulating with scapula. Metacarpals second and third of almost equal length, shorter than fourth and fifth. The fourth metacarpal shows a distinct dilation on the inner side of distal end. Short and expanded deltoid ridge of humerus in males. Intercalary cartilage between two distal phalanges of fingers and toes present. Terminal phalange bifurcate, more or less Y-shaped, both the arms of which are inwardly curved at tip and main stalk with ventromedian ridge. Vertebral column procoelous and moderately long.

**Call notes:** Being strictly nocturnal, they are active after dark during the monsoon months (July-August). Male frogs can only be located while they emit a specific vocal sound *thrrik-thrrik* — *thrik thrik thrik* in or near vegetation. Only a trained ear can successfully distinguish them from chorus calls of several other frogs and toads and also orthopterans of different kinds.

**Food and feeding habits:** Their food and feeding behaviour in captivity were observed. These tree frogs exhibit diet preference for nocturnal insects like cockroaches, spiders, ants, grasshoppers and small hemipterans. The study of preserved specimens revealed that the stomach contents of females had more food-items than males. It is probable that the males were caught while calling, which inhibits them from catching prey. The food items were primarily spiders, grasshoppers, geophylids and aphids.

**Habit and habitat:** In Dudwa National Park these rare tree frogs are widely distributed, but their concentration near Sathiana and Belraien was ap-

parent. During the monsoon period a fairly good number of frogs appeared at night near the forested patch, but it was not possible to detect them by day near the site where they were observed at night. Their presence at night at these sites may perhaps be attributed to the fact that the males emit a specific breeding call within the tall grassy patch near dense sal *Shorea robusta* forest with considerable undergrowth of herbaceous plants.

While they can be fairly easily located by powerful torch-light, they stop their vocal display which makes them almost impossible to locate because of their harmonising coloration and sitting posture. The males being more active and agile, one can locate them only when they jump from one twig to the other. These rhacophorids are very much frogs of the night, spending the day in a secluded retreat inside a hollow tree or in the obscurity of dense foliage, and coming out at dusk to hunt prey, mainly nocturnal insects. Captive frogs display their activity only at night; by day they usually take shelter beneath the broad leaves and also within the hollow space in between the petiole and stem of tall elephant grasses. It was also noted that their jumping activity starts at dark rather than by day when they prefer crawling on stems. During the day they do not feed on insects supplied to them. Their preference for moist swampy conditions at night was evident by their behaviour in captivity. Their coloration looks dull by day, but appeared bright when observed at night with a torch-light.

**Conservation:** Recent forest management practices of burning the over grown grasses during summer poses a great threat to the fauna which takes refuge for its survival from nearby areas perpetually encroached by man and domesticated livestock, depleting the natural forest ecosystem. Hence this terai grassland that stretches across the Himalayan foothills has been under sustained biotic pressure. A substantial portion of grassland has already been converted into agricultural land. Some areas that have escaped this onslaught have been earmarked for conservation of bigger animals.

The effect of management practices like burning on smaller groups of ecologically diverse, viable species has not been given due attention. This rhacophorid is most uncommon and, therefore, a study on its ecology would be both interesting and challenging. A sustainable population of these remarkably adapted tree frogs need protection. In view of the above mentioned facts its inclusion in Schedule I of Wildlife (Protection) Act of India, is recommended.

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